

# Forest policy developments in changing societies - political trends and challenges to research

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## ***Forest Policy Developments in Changing Societies – Political Trends and Challenges to Research***

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### **Abstract**

The paper shows the increased complexity of political processes and forestry issues in international, European and national policy development. It discusses different dimensions of a systematic approach in developing socio-economic research on human environment system interactions addressing sustainable land management at ecosystem, landscape and ecosphere levels. It concludes that an interdisciplinary research approach combining natural sciences and socio-economic disciplines is essential in order to build a more permeable science-policy interface, to gain more knowledge about human-environment system interactions, and to provide tangible and useful information to politicians and the public.

**Key Words:** Forest Research, Ecosystem Research, Human-Environment System Interactions, Forest Policy, Sustainable Land Management,

## 1 Introduction

Sustainable development, balancing economic, social and environmental goals concerning renewable natural resources, is today the overarching principal of forestry. Changes in the attitudes of the public towards forest and new political actors pressing for more emphasis on the their social meaning as an integral part of landscape and environment are driving forces which demand new approaches in the protection, use and management of forest ecosystems, and more public participation in making decisions on their use and management. Within this context the paper addresses the following two questions:

- What are the significant political processes that have occurred over the last years and what are the present trends in public policy making with regard to improved forest protection, conservation and development?
- What are the implications for forestry and ecosystem research in order to gain more knowledge on the complexity of human-environment system interactions and to make politically relevant recommendations for sustainable land management practices at landscape and ecosphere levels?

The first part of the paper focuses on the global need for maintaining a sustainable resource base as stipulated by the World Summit on Sustainable Development in 2002 which places forests and forestry development clearly into a multi-sector context. It emphasises the European scale of the forest sector and the importance of political initiatives and measures that occur at the European level. The second part provides a brief diagnosis of the dynamic changes and trends in national forest policy developments as they can be identified in many European countries and in particular in the countries of Central and Eastern Europe. The third part of the paper deals with the issue of how the increased complexity of forestry issues and political processes can be met by new interdisciplinary forest research focusing on human environment system interaction at different spatial scales and integrating more consistently natural sciences research with research on the cultural, social, economic and political dimensions of sustainable land management.

## 2 Forestry Development in a Global and European Perspective

*The Global Context of Maintaining a Sustainable Resource Base:* The World Summit on Sustainable Development, which took place in Johannesburg, South Africa in 2002, reconfirms the outcomes of the major United Nation conferences and international agreements since Rio. It places forests into a multi-sector context as an important part of the renewable sustainable natural resource base. It acknowledges the multiple and varying outputs from forests for poverty alleviation, as raw material and

energy resources, and as natural habitats and environment. Achievements of sustainable forest management, nationally and globally, through partnerships among interested governments and stakeholders, are essential goals of sustainable development. This includes the private sector, indigenous and local communities and non-governmental organisations.

The Plan of Implementation puts strong emphasis on an integrative approach in protecting and managing the natural resource base as a whole and states that human activities have an increasing impact on the integrity of the ecosystem (WSSD 2002). It underlines the necessity to implement strategies, which are based on targets adopted at the national and/or regional levels in order to protect ecosystems and to achieve an integrated management of land, water and living resources. The Plan highlights the role of forests in important policy domains such as natural resources management (Section 23), agriculture (Section 38d), desertification (Section 39d), and mountains (Section 40b). It also shows that land use and forest management decisions have substantial links to political decision addressing measures on climate change (Section 36), maintaining biodiversity (Section 42), and the institutional framework for sustainable development (Section 120 and following).

The establishment of a constitutional framework and of a public security system provides the foundation for state interventions through guaranteeing the rule of law (von Prittwitz et al. 1994). Both are fundamental to legislation regulating specific policy domains. Laws on economic production and technology development have strong forward linkages to the sector and cross-sector laws inasmuch as the natural resource base and environment have an important impact on economic activities. Laws promoting development, security of subsistence and well-being of people depend to a large extent on backward linkages to social and economic policies as well as on the constitutional framework that regulates, for instance, ownership rights and entrepreneurial activities. Sector laws and policy programmes show a high degree of positive and negative connections among each other.

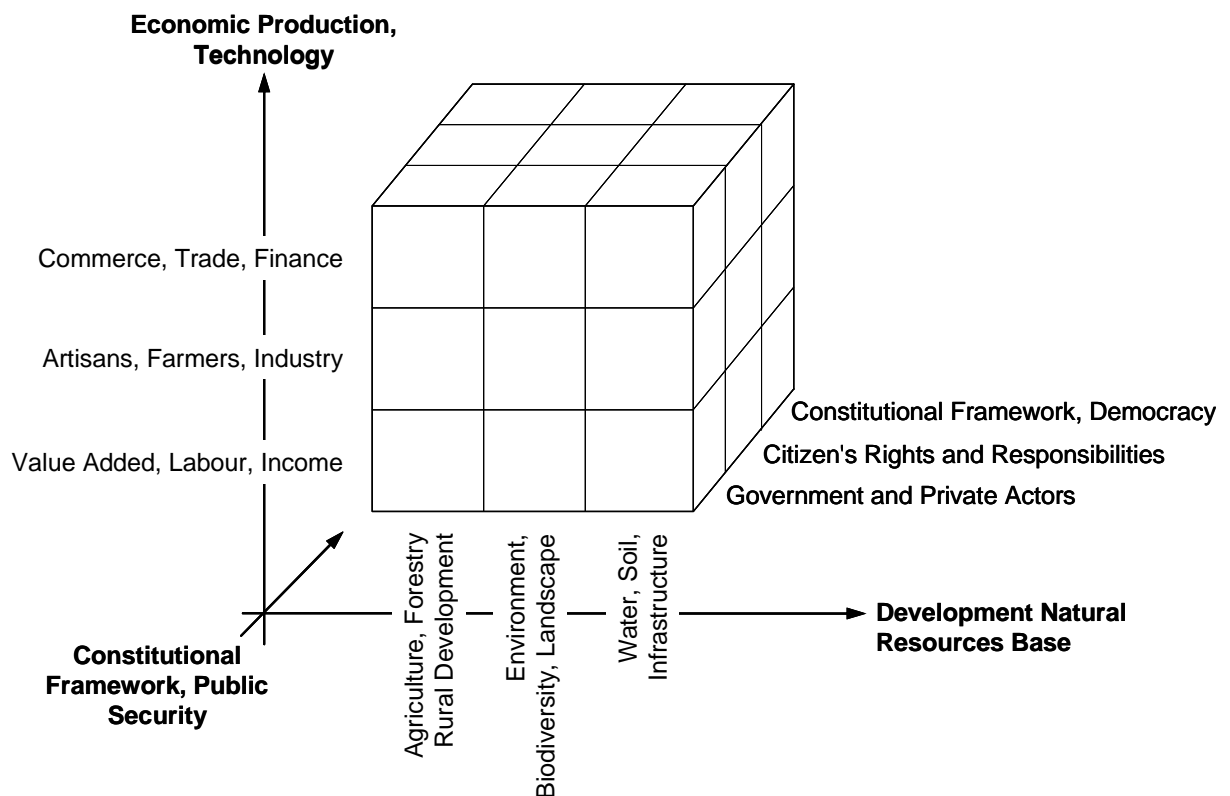
*Figure 1* shows different kinds of public policies and laws at stake, depending on the particular situation of a country, in order to achieve an integrative approach in protecting and managing the natural resource base.

- Policies and laws establishing a constitutional framework and a public security system guarantee the rule of law, provide a foundation for private activities and entrepreneurship, and are fundamental to define state competencies and the content of public policy domains.
- Economic, trade and finance policies and legislation that establish a framework for socio-economic production and cultural integration have strong backward

links to the constitution and important forward links to sector and cross-sector policy programmes.

- Laws and policies promoting development and security for subsistence, for instance, through technological innovation, research and education, and through environmental protection have important feed-backs to economic productivity, income generation and social integration.

*Figure 1: Different Categories of Laws in Maintaining the Natural Resource Base*



*The International Forest Regime:* An expression of the global political context in which forests are now placed is the emerging international forest regime which is based on five main pillars:

- International legal instruments such as conventions, agreements and declarations addressing forests and forestry directly or indirectly;
- World-wide political processes within the United Nations System involving governments, non-governmental organisations, the private sector and indigenous and local communities;
- Regional forest-related initiatives which operate at present in several continents and develop their own political agenda on forests and the forest sector;

- International Criteria and Indicator Processes which provide eco-region specific standards for sustainable forest management certification systems;
- National Forest Program Processes which are largely based on stakeholder concertation and allow to concretize international commitments of individual countries.

A substantial expansion of international laws on environment and development has taken place, which establishes a multi sector framework for forestry (FAO 2002). The Forest Principles are innovative and comprehensive by intention but non-binding. The principles contribute to make international discussions on forests more substantial and have probably changed the thinking of many professionals. However, there remain at present significant gaps between the non-binding statements on forest protection and management and the goals and formal obligations of the three conventions adopted at the Rio Conference in 1992 which are the frame convention on climate change followed by the Kyoto protocol, the convention on biological diversity, and the convention to combat desertification. This makes it difficult to transmit global and cross-sector objectives on climate change, biodiversity and desertification into consistent national policies of environmental protection and to support integrated approaches in promoting sustainable land management practices at local levels.

*European Dimension of the Forest and Wood Products Sector:* Europe's move towards progressive economic development, open civil societies, democratic rule and common political institutions has many faces. There is the Council of Europe in Strasbourg, which offers a political platform for more than 40 European countries. There is the European Human Rights Convention, which provides a common framework for fundamental rights of citizens. And there are many trans-national and pan-European institutions and processes that deal with economic, social and environmental issues of common concern.

The steps towards more economic, social and political integration in Europe have far reaching implications for the forest and wood industry sector. For the wood products industry a continental European space offers opportunities and challenges such as (European Commission 2000):

- New and larger markets combined with structural changes in wood industries;
- More market and price competition inside Europe;
- A gain in efficiency and productivity in larger industrial units;
- Stronger positions but also more competition in world markets.

The impacts of the expanding network of political declarations, agreements and binding legal instruments that govern sustainable forest uses and management are manifold, challenging, and bring about new perspectives of European forestry development. They lead to:

- A new vision of the large variety of European forests;
- A more concrete understanding of common responsibilities;
- Forest ecosystem networks covering large European regions;
- Progressive adaptations of national policies and laws;
- Common management principles and standards;
- Increasingly integrated research and education networks at a European scale;
- A new role of European forestry and science in world forestry.

*A Political Platform for European Forests:* The most important Pan-European institution in forestry matters is at present the *Ministerial Conference for the Protection of Forests in Europe* which involves more than 40 countries, including the Russian Federation. It started with its first conference in Strasbourg in 1990 as a reaction to the years of forest threats due to atmospheric pollution. It developed rapidly to a common intergovernmental forum addressing fundamental economic, social and environmental issues. An important step was made at the 1994 Helsinki conference in developing a common definition of sustainable forest management. As a follow-up, an agreement was built on 6 relevant indicators combined with quantitative and qualitative criteria for evaluation, which were endorsed by a resolution of the Lisbon conference in 1998. The Lisbon conference adopted a second resolution focusing on human resource development and socio-economic issues. Sustainable management, national forest programmes and socio-economic concerns remain on the agenda (MCPFE 2003a).

The Vienna Conference of April 2003 followed this line under the far-reaching title “Living Forest Summit: Common Benefits, Common responsibilities”. The general declaration and resolutions of the Vienna Conference show the actual common political dimensions of European forests and forestry and are a valuable information source for policy analysis (MCPFE 2003b). The five resolutions adopted during the Conference address cross-sector cooperation and national forest programmes, economic viability of sustainable forest management, social and cultural dimensions



of forestry, forest biological diversity, and linkages between climate change and sustainable forest management.

*The Role of the European Union:* A corner stone contributing to cooperation in many domains and favouring a new European identity is the *European Union* itself. The Union is by no means Europe, neither in its extension, nor in its global richness, nor in its great diversity. However, its increasing momentum is a driving factor towards a more permeable and integrative continent. It is a continent in which people can move according to their personal choice and in which trans-national and national political institutions coexist. The European Union (EU) offers an interesting example where a supranational policy framework has gained considerable momentum and importance both for policymaking in the member countries as well as in international policy processes. With regard to forest conservation and forestry development, the EU example is of particular interest as its policy and legal framework relies increasingly on cross-sector measures (Cirelli and Schmithüsen 2000).

The supranational framework operates through Community Council regulations and directives, which are implemented by the member states either as direct EU regulations or by adjustment of national policies and regulations. Not having specific competencies in forestry matters, the EU has adopted numerous measures in other policy domains that have immediate and largely positive impacts on forests and forest management. This is particularly the case for policies relating to agriculture, rural development, nature conservation and environmental protection. Community programmes on technology development, consumer safety, research and development, and education are other domains of importance to the forestry and wood-processing sector.

*Europe's Role in World Forestry:* A new understanding of the European role and opportunities in the forest sector accrues from the continental scale of the forest resources. According to the most recent FAO statistics the total forest area in Europe is over a billion hectares or slightly more than a quarter of the world's forests (FAO 2001). Western and Central European forests extend over an area of 170 million hectares, of which 115 million are situated in the European Union (UN-ECE/FAO 2000). More than 80 % of the total forest area belongs to countries of the Community of Independent States (CIS). And again the large majority of the CIS country forests (90 %) are situated in Russia.

At the same time a new understanding of Europe's role in international forestry develops. In fact European engagements and initiatives make already important contributions to worldwide efforts to preserve rare and significant forest ecosystems and to manage production forests in a sustainable manner. The increasing political

cooperation, the common concerns on solving environmental problems jointly, and the building of common research and teaching networks are important assets for the future. The European Union and the member countries concert their objectives and measures increasingly and are strongly involved in all important international processes and programmes of the UN System addressing environment and development.

### 3 Progressive Change in National Forest Policies and Legislation

*Role of National Policies and Legislation:* The fundamental issues of the meaning and significance of forests in a particular society and at a given time are in a process of continuous change. Problems that seemed solved in the past need now solutions that take the new economic, political and social context into account. Adaptation and innovation of forest policies remain on the political agenda in the European countries. Global and regional trends press for a continuous innovation in policy development. They determine the conditions of national policy making to a considerable extent; influence the attitudes and behaviour of citizens, land users and land managers; produce varying networks of political actors; and establish complex multi-sector and multilevel policy networks.

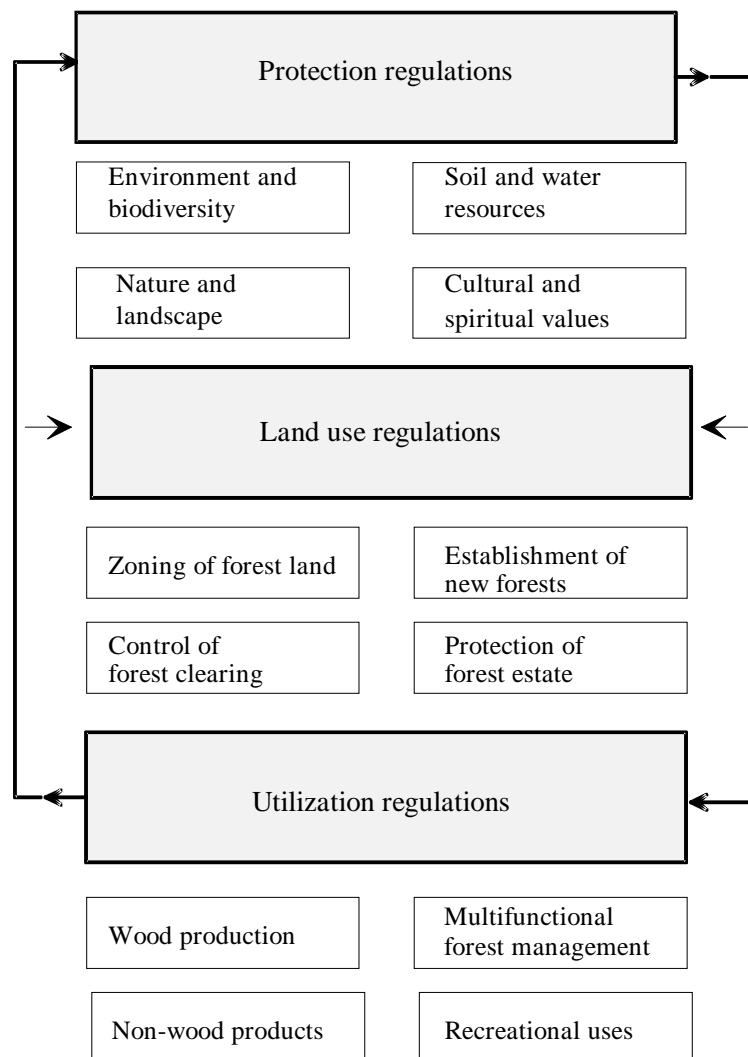
*Forest Policies and Laws Addressing the Existence Value of Forests:* In adapting to the principles of sustainable development, modern forest policies and legislation need to address the full economic, social and environmental value of forests. This implies a combination of resources protection, land use and land management rules (*Figure 2*):

- Protection regulations refer to maintaining environment and biodiversity, to nature and landscape protection, and to the preservation of cultural and spiritual values associated with trees and forests.
- Land-use regulations provide for zoning of forest land, control of forest clearing, protection of a permanent forest estate, and for the establishment of new forest resources through afforestation.
- Utilisation and management regulations determine responsibilities of forest owners with regard to sustainable production of wood and non-wood products, the protection of soil and water resources as well as public access to forests and recreational uses.

*Reformulation of Forest Policy and Laws in European Countries:* The public framework for protecting and managing forest resources as well as the corresponding laws has been revised in practically all European countries (Schmithüsen et al. 2000). Major changes are occurring at present in Central and Eastern European countries. In

transition to an open civil society, democratic institutions and a market economy, they have a difficult task. They have to develop a completely new policy and legal framework for addressing agriculture and forestry, nature conservation and environmental protection (Mekouar and Castelein 2002). Changes to improve the resources utilisation framework in the European countries of the forest sector have been greatly influenced by the growing political and social concerns related to the prevailing forestry practices. Societal demands on private and public forests, together with responses from within the forestry community and from the public at large, have received considerable attention from politicians and the forest administration. Altogether forest policies in most European countries follow increasingly internationally agreed objectives.

*Figure 2: Forest Policies and Laws Regulating Protection, Land use and Utilisation*



*Expanding and more Comprehensive Policy Objectives:* The goals of forest policy have become more diversified and comprehensive. Moving from a perspective, which focused on wood as a sustainable resource, they now address a wide range of private and public goods and values and acknowledge the equal importance of production and conservation. Policy goals are incremental and refer to the role of forests as multifunctional resources; for their economic potential and their importance for the environment. Increasingly they address the variety of ecosystems, the need to maintain biodiversity and the development potential of forestry in rural and urban areas. Similar dynamic processes with regard to the incremental objectives of policy and law have occurred since the 1970<sup>ies</sup> in the USA and Canada (Schmithüsen and Siegel 1997).

*Multifunctional and Close to Nature Forestry Practices:* New and amended policies and laws favour multifunctional forest management as a land-use strategy that is capable of functioning among divergent social interests and local conditions. Multifunctional forest management practices are highly consistent with the principle of sustainable development and imply foremost:

- Decision-making processes involving forest owners, the principal users and environmental groups on an equal footing;
- New balances between private and public interests and the elaboration of workable arrangements for landowners facing public demands;
- A shift from governmental and hierarchical regulatory systems to negotiation, public process steering and joint management responsibilities;
- Realistic financial arrangements involving market proceeds, public funding and contributions from private user and interest groups to provide multiple forestry outputs.

Close-to-nature forestry practices are another land management strategy that contributes to maintain biodiversity, variety of ecosystems and diversified landscapes. It favours flexible and long-term production cycles, offers attractive areas for recreation and leisure activities, and leaves options for future uses and developments. In relying on natural site factors, close to nature forestry combines more consistently than other management practices economic necessities with multiple social and environmental requirements.

*Joint Private and Public Management Responsibilities:* The incremental role of public policies addressing forest protection and management makes it necessary to redefine the roles of the private and public sectors; to find equitable and effective balances between the benefits for, and responsibilities of stakeholders; and to adapt the role of

government from intervention to process steering. New forms of joint management responsibilities for the forests in rural and urban areas need to be agreed upon in order to maintain economic benefits from wood production and processing, to safeguard the environment, to protect flora and fauna, and to preserve the cultural heritage, which forests represent in our societies. Cross-sector policy linkages and multi-sector policy networks are of fundamental importance in order to manage forest ecosystems and landscapes in a sustainable manner (FAO 2003, Schmithüsen 2003).

*Multilevel Policy Networks:* The combination of global, European and national commitments leads to an increasingly complex framework of policies with multilevel impacts. At the global level, free trade, environmental protection and biodiversity are dominant subjects. Forest-related aspects are increased industrial uses through access to new areas, reduction of large-scale deforestation, and conservation of natural forests. At the supra-national level, major issues are structural changes in agriculture, and the protection of environment and water resources. Afforestation of marginal land and criteria and indicators for sustainable forest development are of importance. At the national level, an emphasis is laid on forestry and wood processing as productive sectors of the economy, and on the regulation of forest management practices. At the local level, multiple forest uses providing employment, protection and recreation are of immediate concern.

#### 4 Challenges to Research on Forest and Landscape Management in Changing Societies

The diagnosis of new trends in forest policy and law developments shows a growing complexity of forestry issues and political processes relevant to forests. The changing conditions for sustainable forest management are to be seen in the overall perspective of maintaining the natural resource base, in a holistic understanding of forests and landscapes, and as part of the overall goal to protect environment and improve quality of life for present and future generations. This is in fact the central theme of wise use of forests and ecosystem management that builds on the legacy of the past and provides opportunities for the future (Farrel et al. 2000).

Research addressing relevant issues of forest policy development is today part of interdisciplinary scientific collaboration on ecosystem and landscape management. Significant policy research issues are:

- What are the driving factors for policy adaptation and change, and to what extent do present policies and legislation take up the challenge of change and innovation?

- What are the implications of policies and laws on multifunctional and sustainable land-use practices and what are the ways and means to foster such practices?
- Which positive and negative linkages exist between forestry policies and other public policies addressing environmental protection and natural resources utilization and what are the ways and means to build comprehensive and consistent policy networks?
- To what extent do policy regulations address the value of forests in a comprehensive manner and allow for reasonable balance between public and private interests?
- What are the conditions for building consensus among stakeholders involved in land management and what are appropriate instruments to foster participation and to develop agreed solutions?
- What are appropriate political and institutional requirements and what policy instruments can be selected in order to promote and support locally adapted land management solutions?

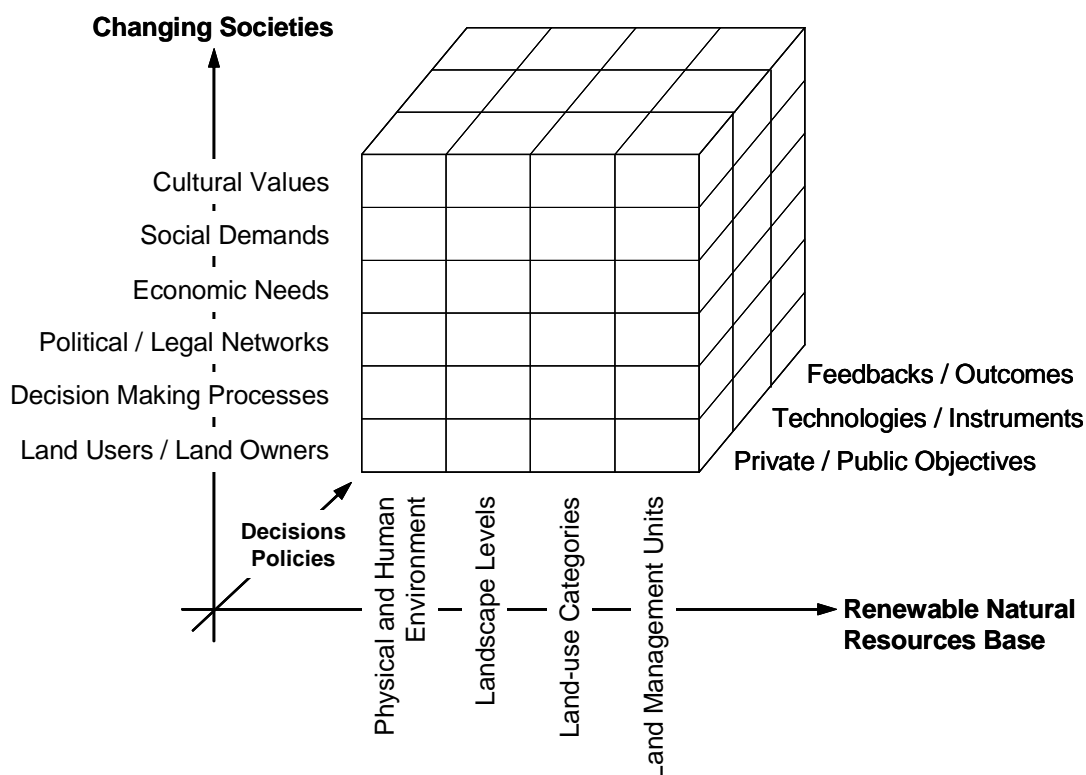
As for other land management sectors, sustainable development is today the overarching political principle and the benchmark for judging to what extent the forest sector and forest policies contribute to economic and social welfare and to a safe environment that benefit present and future generations. The essential content of this principle is that economic growth, social integration and caring for a liveable environment are on an equal footing. Economic growth, social integration and protection of the environment depend on each other, cannot be substituted for, and are fundamental to social progress and common welfare. The principal of sustainable development and the more specific political commitments of countries and the international community set the task for research and science.

The development of an integrative perspective to gain more knowledge about the interactions among social systems and human behaviour, ecosystem processes and environmental change is essential in order to understand more closely the impacts and feedbacks between man and his natural resource base. With regard to forests one has to understand the interactions between society and forest ecosystems, their social and cultural meaning, their potential for providing different combinations of goods and services, and their stability and biodiversity under alternative management systems (Piussi and Farrel, 2000; Führer 2000).

*Figure 3* indicates different dimensions of a systematic approach in order to develop socio-economic research on human environment system interactions at various scales. It relates dynamics and change as constituting elements in all societies to impacts on and feedbacks from the renewable natural resource base. It considers as a third

dimension objectives, technologies, instruments, outcomes and feedbacks as key elements in public policy development and private and collective decision making processes.

*Figure 3: Human Environment System Interactions Related to Land Management at Ecosystem, Landscape and Ecosphere Levels*



The *first dimension* deals with change in societies. Cultural values expressed, for instance, in personal life styles and spiritual convictions, and social demands that relate to individual freedom, democratic participation and political organization are important driving factors that induce and reflect dimensions of societal change. In combination with changing economic needs and opportunities to produce multiple goods and services they initiate continuously changes and innovations in the prevailing political and legal systems. And altogether, these factors determine to a large extent individual and collective decision-making processes in natural resources utilization and management with landowners and land users as important primary agents.

The *second dimension* addresses present and likely future reciprocal interactions between human interventions and the renewable natural resources base. This includes global and regional environmental interactions; interactions at the level of landscapes,

ecosystems or watersheds; interactions that result from alternative or combined land use systems; and interactions at the level of individual or corporative ownership and land management units.

Significant elements of the *third dimension* are, for instance, the relationship between private and public interests and objectives; existing and new technologies in land management; and available tools such as effective and cost efficient political and economic instruments, and the feedbacks and outcomes from individual decisions and public policy measures. The latter are important signals to land managers, stakeholders and policy makers which show whether the taken course of action leads to satisfying results or requires corrections and further intervention.

The options which individuals and societies have and the choices they make in land uses and land management practices depend on complex interactions between demographic, socio-economic, political and institutional, physical and biogeochemical, and biological factors. One of the significant challenges to the research agenda is the need to explain the reciprocal links between environmental changes and different land use systems and to analyse the implications for appropriate choices and land management decisions in ecosystem and landscape management.

Multidisciplinary research is essential in order to identify the factors of change within the reciprocal relationships and to evaluate in quantitative and qualitative terms the effects and dynamics of human-environment system interactions. On the basis of such an analysis substantive proposals for improvements in land management practices can be made which are commensurate with the demands of landowners, land users and society as a whole. This implies to investigate the characteristics, dynamics and vulnerability of human-environment systems in a global and regional context, as well at the level of landscapes, distinct land-use categories, ownership and land management units.

A comprehensive understanding of human environment system interactions implies to acknowledge the cultural, social, economic and political dimensions of society respectively the societal norms which they induce as permanent factors of change. This demonstrates the obvious need for an interdisciplinary research approach combining social and cultural sciences, political and economic sciences, and decision making sciences. Such research has its own disciplinary methodological basis and needs to facilitate the integration of quantitative and qualitative knowledge (Scholz and Tietje 2002):

- *Socio-empirical and cultural research* is required, for example, in order to gain an understanding of the attitudes, perceptions and levels of acceptance of



individuals, stakeholders, and societal groups; to show the variety of personal and collective values and their dynamics of change, or to identify motives and objectives in making concrete decisions in land management.

- *Policy and decision making research* refers, for instance, to participatory mechanisms and stakeholder involvement; to different forms of governance and political organisation; distribution of competences at different levels of government; decentralisation and political process steering; and to cross-sector policy effects and appropriate forms of political coordination.
- *Inputs from economic disciplines* and in particular from environmental and natural resource economics are necessary in order to investigate positive and negative external effects in quantitative and monetary terms. It is essential to determine ways and means for an effective internalisation of positive and negative effects, to identify trade offs between different categories of land use and forest conversion, to assess cost-benefits and cost-effectiveness of alternative land use management systems, and to quantify transaction costs that result from different land tenure systems.

The three dimensions indicated in *Figure 3* present a framework to structure important human-environment system interactions at the ecosphere and landscape levels. They allow to identify a critical path of socio-economic conditions, regulating mechanisms and tools of intervention which are crucial in order maintain or to foster sustainable utilization of the renewable natural resources base. This again permits to construct analytical action oriented frameworks that show critical positive and negative feedbacks between human and physical regulation systems. A selective approach focusing on key points in public and private decision-making processes increases the practical relevance of the frameworks and models. The reciprocal relationships may be analyzed at the scale of ownership and management units, at different landscape scales, or with regard to their regional or global importance.

It is a political necessity to built a more permeable science-policy interface and to develop innovate and more comprehensive interdisciplinary research networks that are able to determine what impacts human interventions have on the environment, to assess individual and collective opportunities and risks that result from changes in the environment, and to show at the same time what concrete measures can be taken to increase benefits and to avoid or reduce risks.

## 5 Conclusions

Balancing economic, social and environmental goals in order to maintain and develop the natural resource base is now the overarching international and European requirement for forest protection and forestry development. At national level forest policies and law have incremental objectives and consider sustainable wood production, infrastructure protection, recreational use, nature and landscape protection and spiritual and aesthetic values in a more comprehensive perspective. Cross-sector policy networks and multi-level policy decision making processes determine increasingly the use and protection of forest.

The implications are far reaching and concern the role of forests, the goals of forest management, and the objectives of public policies addressing sustainable forest management.

- Public perception of the meaning of forests moves from a tradition sectoral view toward a global view of forests as economic resources, social space and a humane environment. Sustainable forest management is largely determined by local circumstances.
- Current forestry practices have to demonstrate that they are in accordance with a large range of public demands and values. They have to balance economic, social and environmental requirements as well as multiple and often divergent public and private interests.
- Forest policies are not anymore the exclusive public policy domain which addresses forest utilization and management. They can only be effective if conceived, formulated and implemented in the context of a growing number of public policies addressing rural development, nature and landscape conservation and environmental protection.

Forestry research today is a significant part of environmental, land management, and ecosystem management sciences. It can make a substantial contribution to the improvement of forest management practices if it considers human-environment system interactions as they affect forest and landscape management in changing societies. An interdisciplinary research approach combining socio-economic analysis and modelling of processes and interactions of the physical resource base can generate consistent advice and recommendations in order to improve land use planning and land management practices, and adopt more effective public policy measures and instruments.

The identification of critical factors determining human-environment interactions and choosing a critical path facilitates interdisciplinary research considerably. It allows to produce consistent, empirical and politically relevant socio-economic frameworks,

which indicate critical factors that are of importance in a given context. The construction of frameworks showing the socio-economic context of sustainable resources utilization and land management is an important step to provide inputs into modeling and system analysis of physical processes and interactions of environmental change. It allows to conceive and design innovative research, which integrates systematically human and physical aspects in common models and system analysis and to build bridges between the natural sciences community, the environmental sciences community and the social sciences community. Combining modelling of physical effects with social, economic and political investigations on different kinds of land use and management practices creates added scientific value.

The question of how to produce such value leads to the more fundamental issue of how to establish appropriate working relations and institutional structures that foster creative and useful interactions between different classes of sciences. This requires, for instance, a continuous dialogue between scientists as well as research designs involving scientists and stakeholders interested in and concerned about forthcoming results. It needs to focus on concrete problems and field studies that are of political relevance in order to build an active research base. And it needs foremost to learn and to understand the science language of different disciplines, and the value and significance of the methods which they have developed and use. All this takes time and is difficult to accomplish. But it is essential in order to come forward with meaningful and practical results that are commensurate with the complexity of changing environmental conditions, productive land management, and wise and sustainable use of forests.

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